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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,838	11/08/2001	John Dwight Larson III	10003247-5	8443

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AGILENT TECHNOLOGIES, INC.
Legal Department, DL429
Intellectual Property Administration
P. O. Box 7599
Loveland, CO 80537-0599

EXAMINER

TUGBANG, ANTHONY D

ART UNIT	PAPER NUMBER
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3729

DATE MAILED: 04/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/008,838

Applicant(s)

LARSON, JOHN DWIGHT

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 14-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because the abstract is not directed to the claimed invention of a process of making. Correction is required. See MPEP § 608.01(b).
2. Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.**

Extensive mechanical and design details of apparatus should not be given.

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: A Method of Making an Acoustic Wave Resonator.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: element 234 in Figure 4 is not mentioned in the specification.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claim 14 is objected to because of the following informalities: the phrase of --of the compensator layer-- should be inserted after “material” (line 9). Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

7. Claims 14-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In Claim 14, the latter phrase of “a substrate” (line 4) is unclear if this is referring to the previous phrase of “a substrate” (line 2). How many substrate(s) are there?

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 14, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnaswamy et al (IEEE Publication entitled "Film Bulk Acoustic Wave Resonator") in view of Peduto et al 3,719,838.

Krishnaswamy discloses a method of fabricating an acoustic resonator comprising: providing a semiconductor substrate (see Fig. 5b); forming a membrane on the substrate such that more than one portion of the membrane is suspended from direct contact with the substrate through cavities formed in the semiconductor substrate; forming an electrode-piezoelectric stack (right piezoelectric film and top electrode shown in Fig. 5b); forming a compensator layer (left piezoelectric film in Fig. 5b) adjacent to the electrode-piezoelectric stack.

The materials of the electrode-piezoelectric stack and compensator layer, each have inherent characteristics of temperature coefficients of frequency. Krishnaswamy does not specifically mention that the electrode-piezoelectric stack has a negative temperature coefficient of frequency and that the compensator layer has a positive temperature coefficient of frequency.

However, Krishnaswamy does teach that the materials of the electrode-piezoelectric stack and compensator layer is a direct function of a range of resonant frequencies of the resonator based upon a frequency range of negative temperature and positive temperature coefficients (shown in Fig. 4 and discussed on page 532).

Alternatively, Peduto suggests that materials of the electrode-piezoelectric stack and compensator layer can be selected with such factors as the material density or modulus of elasticity, to have either a negative temperature coefficient of frequency or a positive coefficient of frequency, based upon the mode of operation of the resonator.

Regarding Claim(s) 17, Peduto also teaches that linear dimensions, i.e. thickness, of the compensator layer can be selected to match a magnitude of temperature-induced effects of resonance or temperature ranges of resonance (all of which is discussed at col. 3, lines 53-62).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Krishnaswamy by selecting the material of the electrode-piezoelectric stack to have a negative temperature coefficient of frequency and the compensator layer to have a positive temperature coefficient of frequency, as suggested by both Krishnaswamy and Peduto, to positively achieve a certain mode of operation of the resonator within a range of temperature coefficient frequencies.

Regarding Claim(s) 18, Krishnaswamy further teaches forming a metallic flashing layer (bottom electrode layer under the piezoelectric in Fig. 5b) on a bottom side of the compensator layer opposite to the electrode-piezoelectric stack (piezoelectric and top electrode).

10. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnaswamy in view of Peduto et al, as applied to claim 14 above, and further in view of Kompanek 4,056,654.

Krishnaswamy, as modified by Peduto, discloses the claimed fabrication method as relied upon above further including that the compensator layer (left piezoelectric material in Fig. 5b) is

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deposited (see page 531). The modified Krishnaswamy method does not teach that the compensator layer material is formed from a nickel-iron alloy.

Kompanek suggests that materials of compensator layers, i.e. piezoelectric layers, can be formed from alloys including nickel and iron to achieve the best characteristics of piezoelectric properties in generating electric field potential (see col. 2, lines 56-63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Krishnaswamy by forming the compensator layer with materials of nickel and iron, as taught by Kompanek, to advantageously achieve the best characteristics of piezoelectric properties in generating electric field potential.

Regarding Claim(s) 16, to have the material of the compensator layer be approximately 35 percent nickel and 65 percent iron is considered to be an effective variable within the level of ordinary skill in the art in forming the alloy material of the compensator layer. In light of the teachings of Kompanek, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the material of the compensator layer of Krishnaswamy by providing the claimed percentages of nickel and iron, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Furthermore, the claimed material, or percentages of alloy material, of the compensator layer does not affect the method steps recited when compared to the prior art.

11. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnaswamy in view of Peduto et al, as applied to claim 14 above, and further in view of Inoue et al 4,456,850.

Krishnaswamy, as modified by Peduto, discloses the claimed fabrication method as relied upon above, further including fabrication alignment. The modified Krishnaswamy method does not mention that the fabrication alignment prevents spurious mode generation resulting from partial coverage of the membrane.

Inoue shows a membrane that is suspended from direct contact (in Fig. 7) from the substrate in the same manner as Krishnaswamy, to prevent spurious mode generation of vibration of the resonator (see col. 7, lines 1-4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Krishnaswamy by preventing spurious mode generation of vibration, a taught by Inoue, to form art recognized equivalent resonators having equivalent membrane structures.

Conclusion

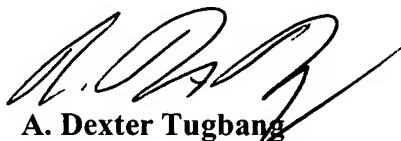
12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 703-308-7599. The examiner can normally be reached on Monday - Friday 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



A. Dexter Tugbang
Primary Examiner
Art Unit 3729

April 28, 2004